REMARKS

In his action dated April 23, 2003, the Examiner entered an objection to drawing Figs. 1-5 as not being labeled "Prior Art." Applicant hereby submits for the Examiner's approval revised Figs. 1-5 with an appropriate correction.

Claims 1-19 are pending. Claims 1, 5, and 9 are currently amended. Claims 15 and 16 are cancelled.

In his action, the Examiner objected to claim 9 due to an informality. The Examiner required that "antiferromagnetic" be changed to -- ferromagnetic -- at line 10 thereof. An appropriate amendment has been made to claim 9.

In his action the Examiner rejected claims 1-4, 15 and 16 under 35 USC 102(e) as being "clearly" anticipated by Gill (US patent 6,275,363). He rejected claims 1-19 under 35 USC 103(a) as being unpatentable over Dill et al. (US patent 6,023,395) in view of Gill '363.

Claims 5-19 stand rejected only under Section 103(a) over Dill et al. in view of Gill. The most obvious difference between claim 5, which indirectly depends from claim 1 through claim 4, and independent claim 9 from claims 1-4, which stand rejected as anticipated by Gill '363, is the introduction of a "bias layer" as an additional layer of the tunneling magnetoresistive stack in both claims 5 and 9. It is important to note here that a bias layer is used in a single-junction tunnel junction sensor. It is not used in a dual-junction tunnel junction sensor.

The above amendment to claim 1 incorporates a "bias layer" into the claim as an additional element. Claim 1 has also been limited to "a single pinned layer." The significance of this latter limitation is discussed below. (Claim 9 describes, without amendment, a single-junction tunnel junction sensor.)

Claim 5 has been appropriately amended to require that the bias layer, now introduced in claim 1 instead of claim 5, be disposed on the free layer.

As the Examiner has implicitly noted, Gill does not disclose a bias layer while it does disclose a free layer composed of a synthetic antiferromagnet ("SAF"). The reason Gill has no bias layer is that it is a dual tunnel junction sensor while applicant's claimed invention is a single tunnel junction sensor.

The Examiner has further noted, correctly, that while Dill et al. does disclose a bias layer (because it is a single-junction tunnel junction sensor), which can include a layer composed of an antiferromagnetic material, Dill et al. does not disclose that the free layer may be an SAF. The Examiner stated that it would be obvious to combine the Gill and Dill et al. references because "doing so would optimize 'in-phase scattering of conduction electrons in response to signal fields' as set forth in the abstract of Gill '363."

Applicant respectfully traverses. As explained throughout Gill '363, when one has a dual tunnel junction sensor with a free layer sandwiched between two pinned layers, the two tunnel junctions respond differently and thus provide an "out of phase"

response to external fields if the ferromagnetic and demagnetizing fields coupled to the free layer from the pinned layers are not "balanced" at the free layer. The whole point of Gill is to balance the ferromagnetic and demagnetizing fields from the two pinned layers in order to provide an in phase response. As part of this effort, Gill requires that the free layer be an SAF because it is both thicker overall than a single-layer free layer of appropriate magnetization and because each of the thicknesses of its AP coupled layers may be independently optimized. Both a thicker free layer and the ability to independently adjust the thickness of the AP coupled layers are needed to "balance" ferromagnetic and demagnetizing fields coupled to the SAF free layer from the two pinned layers on opposite sides of the free layer. When the net ferromagnetic and demagnetizing fields from the pinned layers are balanced, each tunnel junction responds "in phase" to external fields. This is what Gill means by "in-phase scattering of conduction electrons in response to signal fields."

> "The linear bit density of the AP coupled free layer structure is improved over the typical single free layer. In the AP coupled free layer structure one of the AP free layers is thicker than the other AP layer resulting in a net magnetic moment of the free layer structure which is designed to match the magnetization of the signal field from the rotating magnetic disk. This permits the thicknesses of the AP free layers of the AP coupled free layer structure to be optimized for in-phase scattering of the conduction electrons through the sensor. In contrast, a single free layer with a thickness that matches the magnetization of the free layer with the magnetization of

high density signal fields from the rotating magnetic disk will be too thin to provide a thickness which optimizes in-phase scattering of conduction electrons through the sensor."

Gill '363, at column 2, line 65 through column 3, line 12.

Applicant respectfully suggests that the purpose for Gill in including an SAF free layer for balancing the performance of two tunnel junctions in a dual tunnel junction sensor provides no suggestion to include an SAF free layer in a single tunnel junction sensor.

Applicant respectfully suggests that Examiner has not provided a prima facie basis for combining Gill and Dill et al. and respectfully requests reconsideration of the claims in light of the above amendment and argument.

Respectfully submitted,

Dated: June 23, 2003

Edward P. Heller
Edward P. Heller
Registration No. 29,075

Moser Patterson & Sheridan
350 Cambridge Avenue
Suite 250
Palo Alto, CA 94306
Telephone: (650) 330-2310
Facsimile: (650) 330-2314